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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/817,009	03/24/2001	Mark B. Lyles	068986.0103	5744

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EXAMINER	
JANSSEN, SHANNON L	

ART UNIT	PAPER NUMBER
1639	

NOTIFICATION DATE	DELIVERY MODE
05/06/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

AustinUSPTO@kslaw.com
AustinIP@kslaw.com

Office Action Summary	Application No. 09/817,009	Applicant(s) LYLES, MARK B.	
	Examiner SHANNON JANSSEN	**Art Unit** 1639	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *December 9, 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,4,7-10,13,14 and 37-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3, 4, 7-10, 13, 14 and 37-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Note: The examiner of record has changed. Please address all future correspondence to the examiner listed at the conclusion of this action, Shannon Janssen.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/9/09 has been entered.

Status of the Claims

Claims 2, 5, 6, 11, 12 and 15-36 have been cancelled. Claims 37-45 have been added as filed on 9/2/08. Claims 1, 3, 4, 7-10, 13, 14 and 37-45 are currently pending and under consideration.

Priority

This application claims priority to U.S. Provisional Patent Application Nos. 60/192,113, filed 3/24/2000.

Maintained Rejections

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Glazer and Yasukawa

Claims 1, 3, 4, 7-10, 13, 14 and 37-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Glazer** et al. (Glazer, M.; Frank, C.; Vinci, R. P.; Mcgali, G.; Fidanza, J.; Beecher, J. "High surface area substrates for DNA arrays" *Materials Research Society Symposium Proceedings* **1999**, *576*, 371-376) and **Yasukawa** et al. (U.S. patent No. 5,629,186) (**May 13, 1997**), and if necessary in view of **Lyles** (WO 96/24631; 8/15/1996). Modifications to the rejection were necessitated by amendments.

For ***claims 1** and **37***, Glazer et al. (see entire document) disclose high surface area substrates for DNA arrays (e.g., see Glazer et al., abstract), which renders obvious claim 1. For example, Glazer et al. disclose two-dimensional arrays of biomolecules that contain at least 100 different molecules on a porous substrate at predefined regions (e.g., see Glazer et al., pages 371-2, Introduction section; see also figure 1-2).

For ***claims 10, 13, 14 and 43-45***, Glazer et al. disclose both oligonucleotides and DNA (e.g., see Glazer et al., pages 371-2, Introduction section). Although Glazer et al. does not explicitly disclose RNA, the reference does teach the genus "oligonucleotides" which only

contains two possible species (i.e., DNA or RNA) and, as a result, the species RNA would be rendered obvious (e.g., see *In re Schauman*, 572 F.2d 312, 197 USPQ 5 (CCPA 1978) (wherein claims to a specific compound were anticipated because the prior art taught a generic formula embracing a limited number of compounds closely related to each other in structure and the properties possessed by the compound class of the prior art was that disclosed for the claimed compound). Here, the genus contains only RNA and DNA and they are closely related in structure because they only differ by one –OH group.

<u>The prior art teachings of Glazer et al. differ from the claimed invention as follows</u>:

For ***claims 1 and 37***, Glazer et al. fail to teach a fused fiber porous material that is manufactured from alumina fibers, silica fibers, and a fusion source. Glazer et al. only recite porous materials that are 67.4% SiO_2, 25.7% B_2O_3 and 6.9% Na_2O (see Glazer et al., page 372, Experiment, Sodium borosilicate glass; see also page 372, paragraphs 2-4). Furthermore, the Glazer reference is deficient in that it does not specifically recite a pore radius (e.g., less than about 10 microns or greater than about 100 microns). Glazer et al. also fail to specifically recite the limitation that all of said material consists of a density of at least six pounds per cubic foot.

For ***claims 3, 4, 38 and 39***, Glazer et al. fail to specifically recite that the porous material can comprise fused fibers of alumina, silica and a fusion source like boron. Furthermore, Glazer et al. also fail to recite that the porous material can be made from a compositions comprising about 1% to about 50% by weight alumina, about 50% to about 98% by weight silica, and about 1% to about 5% by weigh boron. Glazer et al. only recites materials that are 67.4% SiO_2, 25.7% B_2O_3 and 6.9% Na_2O (e.g., see Glazer et al., page 372, Experiment, Sodium borosilicate glass; see also page 372, paragraphs 2-4).

For ***claims 7-9 and 40-42***, Glazer et al. fail to specifically recite that the percentage of exposed surface is at least about 50%, 75% or 95% silicon dioxide.

<u>However</u>, **Yasukawa**, et al. teach the following limitations that are deficient in Glazer et al.:

For ***claims 1 and 37***, Yasukawa et al. teach fused fibrous ceramic materials that are prepared from amorphous silica and/or alumina fibers with 2 to 12 % boron nitride (e.g., see Yasukawa, et al., abstract). Yasukawa et al. disclose the "silica fibers have ... fiber diameters between about 5 to 20 μm" (e.g., see column 1, lines 34-35 wherein 20 μm >> 10 μm). Yasukawa et al. disclose the "silica fibers have ... fiber diameters between about 5 to 20 μm" (e.g., see column 1, lines 34-35 wherein 20 μm >> 10 μm). The Yasukawa reference also teaches fibers with various sizes (such as 1-20 μm) to achieve the desired "pore size" (e.g. col.2, lines 16+). The reference also teaches the mixed fibers form 3-D "continuous network of interconnecting voids or <u>pores</u>" as shown by the SEM micrograph (see, for example, Figure 2B). Yasukawa et al. also teach that pore size is dependent on fiber diameter, such that larger diameter fibers result in larger pore sizes due to the different packing densities (see col 4, lines 53-59). In addition, because the Yasukawa reference teach generating matrices with fibers of various sizes so the desired pore size can be achieved, the same compositions and fiber sizes (diameters) as the instant application, and that the pore size is dependent on fiber diameter, it would have been obvious to one skilled in the art to substitute one fiber size for the other to achieve the predictable result of generating matrices with the desired pore size (or diameter).

Further, differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). No criticality is seen in applicant's particular porosity ranges. Any distinction is a matter of degree and not of kind.

In addition, Yasukawa et al. disclose that the density of said material may be greater than six pounds per cubic foot or up to 12 pounds/ft^3 (e.g., see claim 8; see also column 1, line 29 wherein 5.5 is disclosed but still considered an obvious variant; see MPEP 2144.05, "Similarly, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium). Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). See MPEP § 2112.01. The Office does not have the

facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best,* 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.). In addition, because the Yasukawa reference teaches making fiber matrices with various densities (or density gradients), it would have been obvious to one skilled in the art to substitute one density (or a density gradient) for the other (such as a homogenous density of at least 6 or 12 pounds/cubic ft) to achieve the predictable result of making matrices (or substrates) with the desired densities.

For ***claims 3, 4, 38 and 39***, Yasukawa et al. teach porous materials with silica, alumina and boron wherein the composition by weight is about 1% to about 50% by weight alumina, about 50% to about 98% by weight silica, and about 1% to about 5% by weight boron (e.g., see Yasukawa et al., column 3, lines 66-67, "<u>80 percent of fiber weight of silica</u> fibers and <u>20 percent by fiber weight of alumina fibers</u>"; see also column 2, lines 4-6, "<u>boron</u> nitride particles, in an amount between about <u>2-12 percent by weight</u> of the total fiber weight").

For ***claims 7-9 and 40-42***, Yasukawa et al. fail to expressly disclose the % silicon dioxide at the exposed surface, but the material is produced using the same alumina/silica fibers and the same boron source in the same proportions and, as a result, would be expected to possess the same % silicon dioxide at the exposed surface as that claimed by Applicants. "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The Office does not have the facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best,* 562

F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.).

Further, **Lyles**, throughout the publication, teach a material (or substrate/matrix) comprising alumina and silica fibers fused by boron materials (e.g. Abstract). The references teach the same compositions of alumina, silica and boron (e.g. p.3, lines 5+) as well as density sizes (e.g. p.5).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use the porous materials disclosed by Yasukawa et al and/or Lyles. with the invention as disclosed by Glazer et al. because Glazer explicitly state that porous materials can be used to increase the number of immobilized probe molecules in DNA arrays (e.g., see Glazer et al, page 372, paragraph 2, "Porous surface layers are a potential routes to increasing the signal from DNA arrays, as they increase the total surface area on which probes can be attached, and hence the capacity for bound target molecules"), which would encompass the porous materials disclosed by Yasukawa.

In addition, a person of ordinary skill in the art would have been motivated to use the porous material disclosed by Yasukawa et al and/or Lyles. because Glazer et al. states, "Inorganic surfaces have the advantage that they are similar to the original glass substrate, so that array fabrication protocols can be used", which would encompass the "inorganic" silica/alumina fibers disclosed by Yasukawa et al. and because the silica/alumina/boron substrate disclosed by Yasukawa et al. can be used and optimized for a variety of applications such as cells culture, as a body implantable material, affinity chromatography, and blood diagnostics (see Yasukawa et al., col 1).

Further, because all the cited references teach methods of using various porous substrates (or matrices) for various purposes, it would have been obvious to one skilled in the art to substitute one alumina/silica fused substrate for the other (with the desired pore and density sizes) to achieve the predictable result of using the biological compatible substrates for various applications.

In addition, a person of ordinary skill in the art would have reasonably expected to be successful because Yasukawa et al. state that the "silica fibers may be derivatized with molecules effective to bind ligand molecules passed through the matrix" (e.g., see column 1, lines 55-56; see also figures 13A-B; see also column 1, lines 49-50, "the matrix may be coated with a biocompatible material at its outer surface"), which would be required for the fabrication of a biological array. Additionally, Yasukawa et al. teach that fiber size is directly related to pore size and that fiber size can be selected for a desired pore size. Further, use of the porous materials as disclosed by Yasukawa et al. (including materials with a density of at least six pounds per cubic foot) to make a substrate for immobilizing biomolecules would yield predictable results (e.g., see Glazer et al. as noted above stating, "Inorganic surfaces have the advantage that they are similar to the original glass substrate, so that array fabrication protocols can be used") in accordance with See *KSR Int. Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

<u>*Goldberg and Yasukawa*</u>

Claims 1, 3, 4, 7-10, 13, 14 and 37-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldberg et al. (U.S. Pat. No. 5,959,098) (Filing Date is **April 17, 1996**) and

Yasukawa et al. (U.S. patent No. 5,629,186) (**May 13, 1997**), and if necessary in view of **Lyles** (WO 96/24631; 8/15/1996).

For ***claims 1 and 37***, Goldberg et al (see entire document) disclose a substrate for the attachment of an array of greater than 100 different biomolecules bound to different predetermined regions of the surface of the porous material (e.g., see Goldberg et al., column 6, section IV), which render obvious claim 1. For example, Goldberg et al discloses a two-dimensional array comprising molecules bound to the material surface (see Goldberg et al, column 6 lines 50-57, see also column 6 last paragraph). Goldberg et al also discloses that said material surface may be porous (see Goldberg et al, column 6, lines 39-49, "Silica aerogels may also be used as substrates ... Porosity may be adjusted by altering reaction conditions by methods known in the art"). Goldberg also discloses that at least 100 different molecules may be bound to the surface of the porous material in different predetermined regions (see Goldberg et al, column 2, lines 2-4, "Each polymer array includes a plurality of different polymer sequences coupled to the surface of the substrate wafer in a different known location") (see also columns 9-14, section V; see especially column 10, last paragraph, "Using the above described methods, arrays may be prepared having all polymer sequences of a given length ... For an array of 8mer or 10mer oligonucleotides, such arrays could have upwards of about 65,536 and 1,048,576 different oligonucleotides respectively").

For ***claims 10, 13, 14 and 43-45***, ***Goldberg*** et al discloses an array of oligonucleotides (see Goldberg et al, columns 9-14, section V; see especially column 10, last paragraph, "Using the above described methods, arrays may be prepared having all polymer sequences of a given length ... For an array of 8mer or 10mer oligonucleotides, such arrays could have upwards of

about 65,536 and 1,048,576 different oligonucleotides respectively"), which anticipates claim 10. Furthermore, Goldberg discloses nucleic acids, a broad term, which would encompass both RNA and DNA. Furthermore, the chemistry for the solid-phase synthesis of both RNA and DNA via modification of the silanol groups is well known in the art. "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The Office does not have the facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best,* 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.).

The prior art teachings of Goldberg et al. differ from the claimed invention as follows:

For ***claims 1*** and ***37***, ***Goldberg*** et al. fail to teach a fused fiber porous material that is manufactured from alumina fibers, silica fibers, and a fusion source. Furthermore, the Goldberg reference is deficient in that it does not specifically recite a pore radius e.g., greater than about 10 microns. Goldberg et al. only teach generally that the porosity may be adjusted using known methods in the art (see Goldberg et al., column 6, lines 39-49). Goldberg et al. are also deficient in that they do not specifically recite the limitation that all of said material consists of a density of at least six pounds per cubic foot.

For **claims 3, 4, 38 and 39**, ***Goldberg*** et al. fail to recite that the porous material can comprise alumina, silica and boron. Furthermore, Goldberg et al. also does not recite that the porous material can be made from a compositions comprising about 1% to about 50% by weight alumina, about 50% to about 98% by weight silica, and about 1% to about 5% by weigh boron.

Goldberg et al. only recites that that "[p]referred substrates generally comprise planar crystalline substrates such as silica based substrates" (see Goldberg et al., column 6, lines 30-31).

For **claims 7-9 and 40-42**, Goldberg et al. fail to specifically recite the that the percentage of exposed surface is at least about 50%, 75% or 95% silicon dioxide.

However, Yasukawa, et al. teach the following limitations that are deficient in Goldberg et al.:

For ***claims 1 and 37***, Yasukawa et al. ***teach*** fused fibrous ceramic materials that are prepared from amorphous silica and/or alumina fibers with 2 to 12 % boron nitride (e.g., see Yasukawa, et al., abstract). The Yasukawa reference also teaches fibers with various sizes (such as 1-20 μm) to achieve the desired "pore size" (e.g. col.2, lines 16+). The reference also teaches the mixed fibers form 3-D "continuous network of interconnecting voids or pores" as shown by the SEM micrograph (see, for example, Figure 2B). Yasukawa et al. also teach that pore size is dependent on fiber diameter, such that larger diameter fibers result in larger pore sizes due to the different packing densities (see col 4, lines 53-59). In addition, because the Yasukawa reference teach generating matrices with fibers of various sizes so the desired pore size can be achieved, the same compositions and fiber sizes (diameters) as the instant application, and that the pore size is dependent on fiber diameter, it would have been obvious to one skilled in the art to substitute one fiber size for the other to achieve the predictable result of generating matrices with the desired pore size (or diameter).

Further, differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or

temperature is critical. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). No criticality is seen in applicant's particular porosity ranges. Any distinction is a matter of degree and not of kind.

In addition, Yasukawa et al. disclose that all of said material consists of a density of about six pounds per cubic foot or up to 12 pounds/ft^3 (e.g., see claim 8; see also column 1, line 29 wherein 5.5 is disclosed but still considered an obvious variant; see MPEP 2144.05, "Similarly, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium). Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). See MPEP § 2112.01. In addition, because the Yasukawa reference teaches making fiber matrices with various densities (or density gradients), it would have been obvious to one skilled in the art to substitute one density (or a density

gradient) for the other (such as a homogenous density of at least 6 or 12 pounds/cubic ft) to achieve the predictable result of making matrices (or substrates) with the desired densities.

For ***claims 3, 4, 38 and 39***, Yasukawa et al. teach porous materials with silica, alumina and boron wherein the ***composition*** by weight is about 1% to about 50% by weight alumina, about 50% to about 98% by weight silica, and about 1% to about 5% by weight boron (e.g., see Yasukawa et al., column 3, lines 66-67, "80 percent of fiber weight of silica fibers and 20 percent by fiber weight of alumina fibers"; see also column 2, lines 4-6, "boron nitride particles, in an amount between about 2-12 percent by weight of the total fiber weight").

For ***claims 1 and 37***, Yasukawa et al. disclose the "silica fibers have ... fiber diameters between about 5 to 20 μm" (e.g., see column 1, lines 34-35 wherein 20 μm >> 10 μm).

For ***claims 1 and 37***, Yasukawa et al. disclose that the matrix may have a density of 3.5 to 12 pounds per cubic foot which is "at least about" 6 pounds per cubic foot or up to 12 pounds/ft^3 (e.g., see claim 8; see also column 1, line 29).

For ***claims 7-9 and 40-42***, Yasukawa et al. fail to expressly disclose the % silicon dioxide at the exposed surface, but the material is produced using the same alumina/silica fibers and the same boron source in the same proportions and, as a result, would be expected to possess the same % silicon dioxide at the exposed surface as that claimed by Applicants. "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The Office does not have the facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best,* 562

F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.).

Further, **Lyles**, throughout the publication, teach a material (or substrate/matrix) comprising alumina and silica fibers fused by boron materials (e.g. Abstract). The references teach the same compositions of alumina, silica and boron (e.g. p.3, lines 5+) as well as density sizes (e.g. p.5).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use the porous materials disclosed by Yasukawa et al and/or Lyles. with the invention as disclosed by Goldberg et al. because Goldberg et al. explicitly state that "[p]referred substrates generally comprise planar crystalline substrates such as silica based substrates" (see Goldberg et al., column 6, lines 30-31), which would encompass the silica based substrates disclosed by Yasukawa et al. (i.e., the silica/alumina/boron substrates).

In addition, a person of ordinary skill in the art would have been motivated to use the porous material disclosed by Yasukawa et al and/or Lyles because silica/alumina/boron substrate disclosed by Yasukawa et al. can be used and optimized for a variety of applications such as cell culture, as a body implantable material, affinity chromatography, and blood diagnostics (see Yasukawa et al., col 1).

Further, because all the cited references teach methods of using various porous substrates (or matrices) for various purposes, it would have been obvious to one skilled in the art to substitute one alumina/silica fused substrate for the other (with the desired pore and density

sizes) to achieve the predictable result of using the biological compatible substrates for various applications.

In addition, a person of ordinary skill in the art would have had a reasonable expectation to be successful because Yasukawa et al. state that the "silica fibers may be derivatized with molecules effective to bind ligand molecules passed through the matrix" (e.g., see column 1, lines 55-56; see also figures 13A-B; see also column 1, lines 49-50, "the matrix may be coated with a biocompatible material at its outer surface"), which would be required for the fabrication of a biological array. Additionally, Yasukawa et al. teach that fiber size is directly related to pore size and that fiber size can be selected for a desired pore size. Further, use of the porous materials as disclosed by Yasukawa et al. (including materials with a density of at least six pounds per cubic foot) to make a substrate for immobilizing biomolecules would yield predictable results in accordance with See *KSR Int. Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

<u>Discussion and Answer to Argument</u>

Applicant's arguments have been fully considered but they are not persuasive for the following reasons (in addition to reasons of record). Each point of applicant's traversal is addressed below (applicant's arguments are in italic):

Applicants argue that all the references fail to disclose a mean pore size of less than 10 micrometers or greater than 100 micrometers (Reply, p.7).

The Yasukawa reference also teaches fibers with various sizes (such as 1-20 μm) to achieve the desired "pore size" (e.g. col.2, lines 16+). The reference also teaches the mixed fibers form 3-D "continuous network of interconnecting voids or <u>pores</u>" as shown by the SEM

micrograph (see, for example, Figure 2B). Yasukawa et al. also teach that pore size is dependent on fiber diameter, such that larger diameter fibers result in larger pore sizes due to the different packing densities (see col 4, lines 53-59). In addition, because the Yasukawa reference teach generating matrices with fibers of various sizes so the desired pore size can be achieved, the same compositions and fiber sizes (diameters) as the instant application, and that the pore size is dependent on fiber diameter, it would have been obvious to one skilled in the art to substitute one fiber size for the other to achieve the predictable result of generating matrices with the desired pore size (or diameter). For example, Yasukawa et al. teaches pore sizes of 10-100 μm for <u>specific</u> fiber sizes (see col 4, lines 36+), however, Yasukawa et al. also teach that fiber size can be varied to achieve a desired pore size.

Further, differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). No criticality is seen in applicant's particular porosity ranges. Any distinction is a matter of degree and not of kind.

The reference also teaches the mixed fibers form 3-D “continuous network of interconnecting voids or <u>pores</u>” as shown by the SEM micrograph (see, for example, Figure 2B) and the “pores” (or voids) have dimensions between about 10-100 μm (e.g. col.3-4, bridging).

Furthermore, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what

the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Accordingly, the 35 U.S.C. § 103(a) rejection cited above is hereby maintained.

New Rejections Necessitated by Amendments

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

<u>*Glazer and Yasukawa*</u>

Claims 1, 3, 4, 7-10, 13, 14 and 37-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Glazer** et al. (Glazer, M.; Frank, C.; Vinci, R. P.; Mcgali, G.; Fidanza, J.; Beecher, J. "High surface area substrates for DNA arrays" *Materials Research Society Symposium Proceedings* **1999**, *576*, 371-376) and **Yasukawa** et al. (U.S. patent No. 5,629,186) (**May 13, 1997**), and if necessary in view of **Lyles** (WO 96/24631; 8/15/1996), **Jones** et al. (US Patent 4937210; 6/26/1990) and **Lyles** et al. (b) (US Patent NO 5964745; 10/12/1999).

The rejection of Claims 1, 3, 4, 7-10, 13, 14 and 37-45 over Glazer et al. and Yasukawa et al., and if necessary in view of Lyles as discussed supra is incorporated herein in its entirety.

While Glazer et al., Yasukawa et al., and Lyles et al. teach porous arrays made of boron fused silica and alumina fibers and further teach optimizing fiber size in order to achive a desired pore size, Glazer et al., Yasukawa et al., and Lyles et al. do not explicitly teach pore sizes of less than 10 μm or larger than 100 μm.

Regarding present claim 1, Lyles et al. (b) teach an alumina/silica/boron matrix for cell culture and further teach that preferred density is dependent on mean cell diameter and maximum cellular integration occurs between 100 and 1000 microns (e.g.: pore size; see col 17).

Regarding present claim 37, Jones et al. teach a porous substrate for cell culture comprising pore sizes of 0.1 to 5 μm (see col 5, lns 17-24, col 6, lns 10-30). Jones et al. further teach optimizing pore size for flow and cell type, e.g., to permit optimal fluid flow and cell capture (see, e.g., cols 5-6).

Therefor it would have been obvious to one of skill in the art at the time of the invention to obtain a pore size of less than 10 μm or greater than 100 μm.

One would have been motivated to do so because Jones et al., Lyles et al., and Yasukawa et. al. all teach optimizing pore size and/or fiber diameter for a particular desired application, such as cell culture, affinity chromatography, and blood diagnostics.

One would have had a reasonable expectation for success because Yasukawa et al. teach that pore size is dependent on fiber diameter and that various fiber diameters can be selected to achieve a desired pore size.

Therefor the teachings of Glazer et al., Yasukawa et al., Lyles et al., Jones et al., and Lyles et al. (b) renders the present invention *prima facie* obvious.

Goldberg and Yasukawa

Claims 1, 3, 4, 7-10, 13, 14 and 37-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldberg et al. (U.S. Pat. No. 5,959,098) (Filing Date is **April 17, 1996**) and Yasukawa et al. (U.S. patent No. 5,629,186) (**May 13, 1997**), and if necessary in view of **Lyles** (WO 96/24631; 8/15/1996), **Jones** et al. (US Patent 4937210; 6/26/1990) and **Lyles** et al. (b) (US Patent NO 5964745; 10/12/1999).

The rejection of Claims 1, 3, 4, 7-10, 13, 14 and 37-45 over Goldberg et al. and Yasukawa et al., and if necessary in view of Lyles, as discussed supra is incorporated herein in its entirety.

While Goldberg et al., Yasukawa et al., and Lyles et al. teach porous arrays made of boron fused silica and alumina fibers and further teach optimizing fiber size in order to achive a desired pore size, Glazer et al., Yasukawa et al., and Lyles et al. do not explicitly teach pore sizes of less than 10 μm or larger than 100 μm.

Regarding present claim 1, Lyles et al. (b) teach an alumina/silica/boron matrix for cell culture and further teach that preferred density is dependent on mean cell diameter and maximum cellular integration occurs between 100 and 1000 microns (e.g.: pore size; see col 17).

Regarding present claim 37, Jones et al. teach a porous substrate for cell culture comprising pore sizes of 0.1 to 5 μm (see col 5, lns 17-24, col 6, lns 10-30). Jones et al. further teach optimizing pore size for flow and cell type, e.g., to permit optimal fluid flow and cell capture (see, e.g., cols 5-6).

Therefor it would have been obvious to one of skill in the art at the time of the invention to obtain a pore size of less than 10 μm or greater than 100 μm.

One would have been motivated to do so because Jones et al., Lyles et al., and Yasukawa et. al. all teach optimizing pore size and/or fiber diameter for a particular desired application, such as cell culture, affinity chromatography, and blood diagnostics.

One would have had a reasonable expectation for success because Yasukawa et al. teach that pore size is dependent on fiber diameter and that various fiber diameters can be selected to achieve a desired pore size.

Therefor the teachings of Goldberg et al., Yasukawa et al., Lyles et al., Jones et al., and Lyles et al. (b) renders the present invention *prima facie* obvious.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHANNON JANSSEN whose telephone number is (571)270-1303. The examiner can normally be reached on Monday-Friday 10:00AM-7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Low can be reached at 571-272-0951. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Amber D. Steele/
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